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Technical Questions: A Review of Key Works on the Question Of Technology

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review of:

Martin Heidegger (1977) *The Question Concerning Technology and Other Essays,* trans. William Lovitt. New York: Harper Torchbooks. (PB: pp.182, $14.00 US, ISBN: 0-06-131969-4)

Max Horkheimer and Theodor W. Adorno (1972) *Dialectic of Enlightenment,* trans. John Cumming. New York: Continuum. (PB: pp.258, $17.96 US, ISBN: 0-8264-0093-0)

Paul Virilio (2000) *The Information Bomb,* trans. Chris Turner. London and New York: Verso. (HB: pp.145, £16.00, ISBN:1-85984-745-5)

Donna J. Haraway (1997) *Modest_Witness@Second_Millennium.FemaleMan©_Meets_Onco Mouse*™. New York and London: Routledge. (PB: pp.361, £15.99, ISBN: 0-415-91245-8)

Introduction

The rise of post industrialism, the replacement of excellence by innovation as a core corporate mantra, the boom in bio-technology and the recent furore around the 'digital economy' all put the question of technology once again at the centre of organisation studies. How then are we to question technology? What might a questioning of technology entail? These questions are not particularly unusual to today, they have been asked throughout modernity. In order to inquire into technology it would therefore seem sensible to examine classic texts. To begin to sketch out what it might mean to pose the question of technology in an altogether adequate way, I shall turn to Martin Heidegger's classic essay 'The question concerning technology'. I will then use particular themes within Heidegger's essay in order to open a review of three central works that investigate (post) modern technology – Horkheimer and Adorno's *Dialectic of Enlightenment*, Virilio's *The Information Bomb*, and Haraway's *Modest_Witness*.

Looking at a Rhine power station and considering a Greek vase

Throughout the writing of Martin Heidegger, the reader will find attempts to reformulate the question of being. *Being and Time* (Heidegger, 1962) contains many attacks on modern scientific approaches to knowing and existing within the world. Heidegger takes the positivist approaches that usually characterise science and technology to task for reinforcing the split between the subject and the world, and its abject failure to discuss the question of being (*ibid*: 11). Heidegger deploys a complex vocabulary in order to begin to talk about being-in-the-world in a way that is founded on, and in direct relation to, the question of being. Heidegger uses these concepts to craft a way of being in the world that does not rely on the Cartesian inheritance of modern positivism.

If we read *Being and Time* as an attempt to craft a vocabulary and 'clear a way' (using Heidegger's phrase) for introducing the question of being, then Heidegger's essay 'The question concerning technology' (QCT) is an attempt to use aspects of this vocabulary in order to ask about the technological apparatuses we moderns have become so utterly dependent on. By doing so he aims to 'bring man into a free relation with technology'. In this essay, Heidegger assumes when we talk of technology, we are not simply talking about the particular apparatuses that confront us from our morning alarm clock to our evening sleeping pill, from the sonography before birth to gas furnace that dis-integrates our dead body into ash. First it should be noted that the German term *Technik* that Heidegger uses is possibly broader than the English technology, and may include the English technique, technics, engineering, and the execution of art. Technology for Heidegger is fundamentally bound up with modern scientific ways of knowing. Throughout this inquiry, Heidegger suggests that this modern scientific manner of knowing and acting on the world is "no mere means. Technology is a way of revealing" (QCT: 12). Technology establishes an apparatus that questions nature, making it reveal itself in very particular ways. Heidegger's analysis of a hydro-electric power station give us some idea of how the complex network of technologies, which establish and run the hydroelectric power stations, reveal the Rhine in a very specific manner:

> The Hydroelectric plant is set into the current of the Rhine. It sets the Rhine to supplying its hydraulic pressure, which sets the turbines turning. This turning sets those machines in motion whose thrust sets going the electric current for which the long-distance power station and its network of cables are set up to dispatch electricity. In the context of the interlocking processes pertaining to the orderly disposition of electrical energy, even the Rhine itself appears as something at our command. The hydroelectric plant is not built into the Rhine as was the old wooden bridge that joined bank with bank for hundreds of years. Rather the river is dammed up into the power plant. What the river is now, namely, a water power supplier, derives from out of the essence of the power station. In order that we may even remotely consider this monstrousness that reigns here, let us ponder for a moment the contrast that speaks here, let us ponder for a moment the contrast that speaks out of the two titles, 'The Rhine' as damned up into the *power* works, and 'The Rhine' as uttered out of the *art* work, in Hölderlin's hymn by that name, But, it will be replied, the Rhine is still a river in the landscape is it not? Perhaps. But how? In no other way than as an object on call for inspection by a tour group ordered there by the vacation industry. (QCT: 16)

This illustration by Heidegger shows how technology does not simply achieve an proscribed end, but actively 'enframes' or 'emplaces' (*Gestell*) an aspect of the world (in this case the Rhine) through its very apparatus.

The problem with the damming of the Rhine, and other modern technologies' enframing of the world is two fold. First, the dam's mode of revealing the world destroys other possible ways of revealing (such as Hölderlin's hymn) and condemns us to a world we only see in terms of technology. The only other perspective we might have on the Rhine is a nostalgic inscription of Hölderlin on a plaque above the Rhine courtesy of the corporation that owns the dam. The second problem with this mode of enframing is that it "not only conceals former ways of revealing, bringing-forth, but it conceals revealing itself and with it that wherein unconcealment, i.e. truth, comes to pass" (QCT: 27). The concealment of 'revealing itself' occurs when 'enframing' (which is one particular mode of revealing) comes to 'regulate and secure' all aspects of the world as the kind of cause-effect relationships associated with positivist science and its technologies. Under this mode of revealing the world becomes enframed as a gigantic web of cause-effect relations:

> Thus where everything that presences exhibits itself in the light of a cause-effect coherence, even God can, for representational thinking, lose all that is exalted and holy, the mysteriousness of his distance. In the light of causality, God can sink to the level of cause. (QCT: 26)

Even as 'Man' takes the place of God as a 'central causal factor', so too 'man' is imputed within this vast web of cause and effect relations and becomes just like the dammed Rhine, becomes part of the 'standing reserve'. One, of course, is reminded of the plethora of technologies which exist in management which enframe people as 'human resources', and go about asking how these resources can be best put to work in a given environment. As 'man' becomes part of this great casual web "he does not apprehend enframing as a claim, that he fails to see himself as the one spoken to, and hence also fails in every way to hear in what respects he ek-sists, from out of his essence, in the realm of an exhortation or address, and thus *can never* encounter only himself" (QCT: 27). Therefore the broader category of revealing comes to be eclipsed by the more recent, more specific category of Enframing. This therefore "blocks the shining-forth and holding-sway of the truth" (QCT: 28).

Towards the end of this essay, Heidegger attempts to "bringing a saving power into (revealing's) shining forth in the midst of the danger" (QCT: 34). This 'saving power' for Heidegger involves considering that *technē* (the Greek word from which technology is derived) did not only include technology. Rather, *technē* included other forms of revealing which often had little to do with the 'enframing' technology such as a dam or a human resource management text. Forms of craft such as Greek vases, and art such as poetry where considered *technē*:

> In Greece, at the outset of the destining of the West, the arts soared to the supreme hight of the revealing granted them. They brought the presence of the gods, brought the dialogue of divine and human destinings, to radiance. And art was simply called *technē*. It was a single, manifold revealing. It was pious, *promos,* i.e. yielding to the holding-sway and the safe-keeping of truth.
>
> The arts were not derived from the artistic. Art works were not enjoyed aesthetically. Art was not a sector of cultural activity.
>
> What, then, was art – perhaps only for that brief and magnificent time? Why did art not bear the modest name *technē*? Because it was a revealing that bought forth and hither, and therefore belonged with *poiēsis.* It was finally that revealing which holds complete sway in all the fine art, in poetry, and in everything poetical that obtained *poiēsis* as its proper name. (QCT: 34)

To reflect on this let us briefly take one instance of advanced ancient Greek technology – the vase. Greek vases were major technological advances in terms of both strategies of decoration and materials used. They were made by nameless artisans. On these vases we find the illustration of heroic battles, gods, and other myths. The vases do not simply seek to provide a handy and attractive place to store flowers or wine. Rather they illustrate particular aspects of human behaviour, they serve as a kind of guide to 'right' or 'ethical living', a kind of *poiēsis*.

The question this poses to us is how we can resist restricting our understanding of technology to 'enframing', and broaden its modes of revealing. To put the question differently: how can we develop an understanding of our modern *technē* akin, but obviously not the same as, the Greeks; how can we broaden the question of technology?

In what follows, I shall look at three works that have attempted to approach the kinds of questions that Heidegger puts forward in his essay on technology. The writers I shall examine are Horkheimer and Adorno's *Dialectic of Enlightenment*, Paul Virillio's *The Information Bomb*, and Donna Haraway's *Modest_Witness@Second_Millennium. FemaleMan©_Meets_OncoMouse™*. Each of these texts directly encounters modern and post modern technology. Each encounter with technology is driven by the overall ethical guide of attempting to 'prepare a free relationship to it' (to use Heidegger's phrase). In order to prepare this relationship, each text attempts to approach technology in relation to a broader social, cultural, economic and political milieu. It is by approaching technology in this broader sense that each of these texts are able to tease out what it may look like as a kind of broader revealing, and ask just what it reveals.

Reading Homer and Sade while watching television

Within the theoretical tragedy that is Adorno and Horkheimer's classic, *Dialectic of Enlightenment* (DE), many soliloquies and swipes at modern technology and its uses bubble up. The broad argument that has served as an inspiration for critical theorists from Habermas (1991) to Sloterdijk (1988) is that modern technology enframes (to use Heidegger's term) humans and the world so they become objects to be manipulated, exploited and even destroyed. This is seen in the regime of Nazi Germany which both Adorno and Horkheimer escaped. What is more interesting in Adorno and Horkheimer's argument is that the country and culture they fled to – the United States of America – also shares exactly the same tendencies. The technological apparatus continues to make objects out of people. Instead of being in the name of the Fatherland, objectification is in the name of capital and industry. What they go on to argue is that this technological objectification of the world is no mere aberration from the history of western civilization. Rather, it is the history of western civilisation that has actually produced this horror. One is reminded of Walter Benjamin's pithy phrase "There is no document of civilization which is not at the same time a document of barbarism" (Benjamin, 1972: 248).

Instead of opting for a swift rejection of the tradition of Enlightenment, Horkheimer and Adorno argue that this tradition of Enlightenment is dialectical, which has produced such horrors and enables both forms of domination, and critiques these very forms:

> Today, when Bacon's utopian vision that we should 'command nature by action' – that is, in practice – has been realized on a tellurian scale, the nature of the thralldom that he ascribed to unsubjected nature is clear. It was domination itself. And knowledge, in which Bacon was certain the 'sovereignty of man lieth hid', can now become the dissolution of domination. But in the face of such a possibility, and in the service of the present age, enlightenment becomes wholesale deception of the masses. (DE:42)

Aside from foreshadowing post-colonial and post-structural critiques of enlightenment, Adorno and Horkheimer's framework confronts modern technology in a wider socio-cultural milieu. If this book does one thing for studies of technology, it disabuses us of the typical narrative found in discourse of technology and in particular corporate innovation. For Adorno, modern technology does not simply appear from the mind of a gifted and eccentric inventor, get funded by this or that venture capitalist, shared among networks of innovation, produced and make the lives of those who use it easier. Instead, modern technology exists firmly within the context of western culture, and it has manifold political, social and cultural effects. This means in order to ask the question of modern technology, one needs to examine not just scientific means of inquiring into and ordering the world, but also the broad attitudes and subjectivities which make possible the 'technologies of mass deception' that Adorno and Horkheimer encountered in Nazi Germany and capitalist America.

An inquiry into modern technology does not lead Adorno and Horkheimer to share the kind of happy conclusion found in narratives of corporate innovation or the knowledge society. Instead technology "does not work by concepts or images, by the fortunate insight, but refers to method, the exploitation of others' work, and capital" (DE: 4). The aim of this technology is "to learn from nature…how to use it in order wholly to dominate it and other men" (ibid). In order to fulfil this kind of domination, modern technology and its culture of enlightenment places every cause on the side of man:

> Oedipus' answer to the Sphinx's riddle: 'It is man!' is the Enlightenment stereotype repeatedly offered as information, irrespective of whether it is faced with a piece of objective intelligence, a bare schematisation, fear of evil powers, or hope of redemption. (DE: 7)

The language used to assess this web of cause and effects is not the subtle pleasures and shifting meaning offered by words. Rather "to the Enlightenment, that which does not reduce to numbers, and ultimately to the one, becomes illusion; modern positivism writes it off as literature" (DE: 7). These universal numbers, schemes of cause and effect, and the technology that they give rise to come to disregard the context into which they are applied. To illustrate this, Horkheimer and Adorno take the instance of the medicine man in so-called primitive society. In order for the medicine man's magic to work, they must draw a circle in which they would 'operate'. It was only in this specific circle, this context, in which their magic would work. Instead, with scientific medicine we find "the replacement of the milieu-bound practices of the medicine man by all-inclusive industrial technology (which) required first of all the autonomy of ideas in regard to objects that was achieved in the reality-adjusted ego." (DE: 11). This abstraction of ideas from their specific circle or context leads to all objects in the world

(be they a waterfall, an animal, a human) being liquidated in abstraction. In a similar vein to Weber, Adorno and Horkheimer see this as having devastating consequences for the modern subject:

> Abstraction, the tool of enlightenment, treats objects as did fate, the notion of which it rejects: it liquidates them. Under the levelling domination of abstraction (which makes everything in nature repeatable), and of industry (for which abstraction ordains repetition), the freedom themselves finally comes to form that 'herd' which Hegel has declared to be the result of the Enlightenment. (DE: 13)

The thinking involved in this process of abstraction for Adorno and Horkheimer "objectifies itself to become an automatic, self-activating process; an impersonation of the machine that it produces itself so that ultimately the machine can replace it" (DE: 25). The world becomes a 'gigantic analytic judgement'. This sorry situation that modern technology and its analytic approach to thinking present the modern subject, leads to a situation where "machinery disables men even as it nurtures them" (DE: 37).

Adorno and Horkheimer contextualise the unhappy situation of modern subjects in a broader history of western culture. In order to examine this broader context of western culture which leads through the dialectic of Enlightenment, Adorno and Horkheimer take a number of key cultural moments.

The first cultural moment of Enlightenment Horkheimer and Adorno focus on is Homer's *Odyssey*, and in particular its hero Odysseus. They argue that within the figure of Odysseus we find a passage from the world of myth towards the wily bourgeois individual. We find Adorno and Horkheimer arguing that Odysseus uses rational tactics akin to the modern subject to negotiate his way out of tight situations. An excellent instance is found in the description of Odysseus and his crew's encounter with the Sirens. Odysseus knows that no man can hear the Siren's without being fatally attracted to them, and subsequently onto the rocks. However, Odysseus and his crew must pass through a passage where they will be in ear-shot of the Sirens. In order to keep rowing without being attracted onto the rocks, Odysseus develops the plan of stopping the ears of his rowers with wax. Like a good tourist or anthropologist of today, Odysseus also desires to hear this mythical song while remaining at an appropriate distance. In order to hear the Sirens without diving off the boat to certain death, he lashes himself to the vessel's mast. The song of the Sirens for Adorno and Horkheimer is a classic instance of myth, and Odysseus' wily plan is the first instance of using rationality in order to stare into the face of myth, yet pass by unharmed. In this sense Odysseus is the forerunner for the scientists who lash themselves to the mast of scientific objectivity in order to stare into the face of life (DNA experiments), and death (Nuclear technologies) itself. The rowers of this modern scientific enterprise – lab assistants, doctoral students and the like, have their ears plugged to the horrifically beautiful songs of life and death, the cries of vivisection, that they row past in the odyssey of research. Therefore Odesseus:

> is already Homo economicus, for whom all reasonable things are alike: hence Odysseus is already a Robinson-ade. Both Odysseus and Crusoe, the two shipwrecked mariners, make their weakness (that of the individual who parts from the collective) their strength. Delivered up to the mercy of the waves, helplessly isolated, their very isolation forces them recklessly to peruse an atomistic interest. (DE: 61)

A second tale that reveals Odysseus' kinship to the modern economist or other purveyor of technology is his encounter with the Cyclops. The Cyclops does not share Odysseus' *ratio* and is declared:

> "a lawless minded creature" this does not mean merely that in his mind he does not respect the laws of civilization, but also that his minds itself, his thinking, is lawless, unsystematic, and rhapsodical, for he cannot solve the bourgeois mental problem of the way an uninvited guest can escape from the cave (by clinging to the ram's bellies instead of riding on its back) and does not see through the sophisticated *double entendre* of Odysseus' false name.[1] (DE: 65)

For Adorno and Horkheimer, Odysseus provides the initial co-ordinates for the subject in the passage out of myth into a kind of pre-modernity. The second cultural moment where the enlightened subject appears is *Juliette* by the Marquis de Sade. Juliette and her circle of erotic bandits take the ethos of ruthless use of *ratio* seriously. Unlike Odysseus or his modern progeny like Immanuel Kant, Juliette puts the ethos and approach of the Enlightenment in the ruthless service of pleasure. Adorno and Horkheimer point out that it is a mistake to presume Juliette and her perverse pleasures to be a symptom of depravity and hence outside the bounds of rationality. Rather, it is through this very technological system she organises and obtains her pleasures:

> Juliette embodies (in psychological terms) neither unsublimated nor regressive libido, but intellectual pleasure in regression – *amor intellectualis diaboli*, the pleasure of attacking civilization with its own weapons. She favours systems and consequences. She is a proficient manipulator of the organ of rational thought. (DE: 95)

Like Lacan (1989), Adorno and Horkheimer go on to draw direct parallels between Sade's characters and the system of rationality found in the work of Kant. Juliette puts into practice a perfect Kantian freedom of individual reason, bringing all "abilities and inclinations under its control (i.e. of reason), and therefore under self control, which prevails over the negative commandment not only to be ruled by one's emotions and inclinations (the duty of apathy); because, unless reason takes the reins of government into its hand, emotion and inclinations will be in control" (p.95, quoting Kant, *Metaphysische Anfänge der Tugendehre,* vol VI p.408). Therefore the clockwork philosopher (whose system of thought remains a foundation in the development of scientific methods of inquiry, technology and the new world order) provides the tools for a figure who is supposed to represent the disillusion of this civilization. This realisation leads Adorno and Horkheimer to argue that enlightenment accommodates even the most perverse and mythical goals. Adorno and Horkheimer use Juliette and her philosophical double, Friedrich Nietzsche, to argue that Enlightenment has within its own terms the ability to destroy it's own very maxims:

> Kant's principal that 'everything is to be done on the basic maxim of one's will as one which, while legislating universally, can act with itself as an object' is also the secret of the superman. Both principals aim at independence from external powers, at the unconditional maturity defined

1 When asked by the Cyclops his name, Odysseus tells him that it is 'no body'. When the Cyclops asks who is passing, Odysseus answers 'no body'. The Cyclops takes Odysseus at his word that no body is passing.

> as the essence of enlightenment. But, of course, inasmuch as dread of lies (which even in the best moments Nietzsche still describes as 'Don-Quixotery') abrogates the Law through self-legislation and everything becomes as transparent as if it were but one great unveiled superstition, enlightenment itself – and indeed, truth in any form – becomes an idol; then we see "that even we enlightened of this modern age, we godless antimetaphysicians, still take *our* fire from the torch lit by a faith that has lived for thousands of years –the Christian belief (which was also the belief of Plato) that God is truth and that truth is divine." (DE: 114-5)

The flame of enlightened thinking that fires modern technology therefore does not constitute a break from religious or mythical forms. Rather for Juliette, Nietzsche, and Adorno and Horkheimer, myth remains firmly at the foundation of our apparent enlightened times. After all, what appears more like a myth or theological doctrine than a cuber-utopia of citizens who effortlessly, freely communicate creating a 'consciousness than spans the globe' pedalled by *Wired* magazine and computer multinationals:

> It's finally time to embrace the future with optimism again in the realisation that this peaceful, inevitable revolution isn't a problem but an opportunity to build a better civilization for ourselves and our children. Our first instruction to writers: amaze us. Our second: Report back from the future about what's coming – about work outside the workplace, markets without masters, entertainment beyond mass media, civic mindedness beyond government, community beyond neighborhood, consciousness that spans the globe. (*Wired*, 1/1, 1995:13)

In sum, Adorno and Horkheimer's reading of Juliette reveals the emptiness at the heart of enlightenment, and how this comes to be either filled with pre-enlightenment myth or can be taken over ruthless pursuit of ones goals such as bloody pleasure. If this latter point is the case, then:

> in Sade as in Mandeville, private vice constitutes a predictive chronicle of the public virtues of the totalitarian era. Not having glossed over or suppressed but to have trumpeted far and wide the impossibility of deriving from reason any fundamental argument against murder fired the hatred which progressives (and they precisely) still direct against Sade and Nietzsche. They were significantly unlike the logical positivists in taking science at its word. The fact that Sade and Nietzsche insist on the *ratio* more decisively than logical positivism, implicitly liberates from its hiding-place the utopia contained in the Kantian notion of reason as in every great philosophy: the utopia of a humanity which, itself no longer distorted, has no further need to distort." (DE: 118-9)

If "the *chronique scandaleuse* of Justine and Juliette, with its production-line methods, and its forshadow(ed) in an eighteenth-century style of the nineteenth century style of the nineteenth-century shockers and twentieth-century mass literature" (DE: 117), then the culture industries were a material manifestation of a culture where technological domination of man and nature becomes part of everyday course. Adorno and Horkheimer saw a clear link between these culture industries of America and fascist propaganda techniques. Each system ruthlessly used technology in order to ensure the continued domination of its subjects, "the decorative industrial management buildings and exhibition centres in authoritarian countries are much the same as anywhere else" (DE: 120), "consumers appear as statistics on research organization charts, and are divided by income group into red, green, and blue areas; the technique that is used for any type of propaganda" (DE: 123). Under the relentless drive of the culture industries people are reduced to mere objects to be manipulated and tabulated. These figures are either called the employees, or in their precious hours outside the labour process, consumers:

> Industry is interested in people merely as customers and employees, and has in fact reduced mankind as a whole and each of its elements to this all-embracing formulae. According to the ruling aspect at the time, ideology emphasizes plan or chance, technology or life, civilization or nature. As employees, men are reminded of the rational organization and urged to fit in like sensible people. As customers, the freedom of choice, the charm of novelty, is demonstrated to them on the screen or in the press by means of the human and the personal anecdote. In either case they remain objects. (DE: 147)

The culture industries for Adorno and Horkheimer represent the spread of the technological rationale ("the rationale of domination itself", DE: 121) into nearly every aspect of society, even aesthetic experience:

> Real life is becoming indistinguishable from the movies. The sound film, far from surpassing the theatre of illusion, leaves no room for imagination or reflection on the part of the audience, who is unable to respond within the structure of the film, yet deviate from its precise detail without losing the thread of the story; hence the film forces its victims to equate it directly with reality. (DE: 126)[2]

What Adorno and Horkheimer prophetically offer here is a foreshadowing of Baudrillard's (1981) suggestion that media images become more real than the real events themselves. Indeed this objectification and manipulation of everything in the modern subjects world through the technological apparatus of the culture industries (which have now blossomed into multimedia global corporations) lead to a bitter state of affairs where "the most intimate reactions of human beings have been so thoroughly reified that the idea of anything specific to themselves now persists only as an utterly abstract notion: personality scarcely signifies anything more than shining white teeth and freedom from body odour and emotion" (DE: 167).

The text therefore moves from the unhappy diagnosis of enlightenment through the emergence of ratio out of myth in Odysseus, the subversion of ratio, to the perverse demands of Juilette, and finally the spread of this ratio with its perverse goals in the modern culture industries. Throughout this movement it is possible to locate how an enlightened attitude so central to the production of modern technology emerges, is subverted, and comes to dominate all aspects of the modern subjects life. By contextualising technology in this broader cultural context, Adorno and Horkheimer aim to broaden the question of technology to include other *technē* including literature in order to let a kind of *poiēsis* emerge. The *poiēsis* which emerges for Adorno and Horkheimer however is a bleak one.

2 This has served as an important point of contention, with a history of cultural studies research focusing on the active negotiation of meaning in films by their audiences (e.g. Fiske, 1989; Walkerdine, 1997).

Knowledge Nations Engaged in Information War

The work of Paul Virilio has received very limited attention in organisation studies (cf: Armitage, 2001). It offers a sustained investigation of 'post-modern' technologies which we might call techno-science. Of particular interest to Virilio is how the (post)modern techno-scientific apparatus is related to the changing politics of space and warfare. In *The Information Bomb* Virilio investigates this question through a series of pithy interconnected essays that draw on particular events including the 1993 bombing of the World Trade Centre, performance art, and Bill Clinton's sexual escapades. This style puts Virilio firmly in the tradition of Roland Barthes (1972) and the work of Jean Baudrillard (1981).

In *The Information Bomb* (IB), Paul Virilio suggests that the new technological apparatus exemplified in the computer network or the human genome project takes a radically new form. For Virilio techno-science represents a break with the conventional scientific attitude that both Heidegger and Adorno and Horkheimer suggest characterise modern technology. With the growing linkages between the military and science through the military-industrial-university complex, Virilio argues that science has "slipped it's philosophical moorings" (IB: 1) through the relentless "pursuit of *limit-performance*, to the detriments of any effort to discover a coherent truth useful to humanity" (IB: 1). The relentless pursuit of 'limit-performance' results in a kind of 'extreme science' that is in some ways similar to 'extreme sports'. Instead of "deliberately risk[ing] one's life on the pretext of achieving a record performance" (IB: 3), techno-science "runs the incalculable risk of the disappearance of all science. As the tragic phenomena of a knowledge which has suddenly become cybernetic, this techno-science becomes, then, as mass techno-culture, the agent not, as in the past, of the acceleration of history, but of the dizzying whirl of *the acceleration of reality* – and that to the detriment of all verisimilitude" (IB: 3). Virilio here suggests that techno-science involves a move away from the organising principal of knowledge being the encyclopaedia towards the organising principal being cybernetic whereby science becomes committed to the development of "heightened virtual reality" (IB: 4). One symptom of this, Virilio argues, is that the truth value of any given scientific discovery begins to lose its value, and hence becomes replaced with the shock value of new techno-scientific adventures:

> That science is now concerned less with truth than with the effect created by the announcement of a new discovery – though not, as used to be the case, a genuine discovery serving the common good… In illustration of these disenchanted remarks, we may usefully criticize the carefully sustained confusion between the *sporting hero* and the *scientist*, between the adventurer who pushes himself violently to his *physical limits* and the white-coated adventurer who pushes himself to the *ethical* limits, the adventurer who experiences the elation of risking not just his own death, but that of the human race. (IB: 4)

These comments risk making historical mistakes about the apparent newness of this scientific adventurer. Many historians and philosophers of science have highlighted how conception of 'adventure' and 'charting uncharted territories' underpin the process of scientific accumulation. This adventurous character of science takes on an extremely physical manifestation in the scientific expeditions that were a feature of colonialism. In these expeditions we find the then advanced technologies of marine engineering and

navigation being used in order to propel scientists to the 'ends of the earth' where they would go about accumulating knowledge in the field of botany, ethnology, and geography. The physical 'adventures' such of Cook's voyages in the Pacific and Magellan's voyage to the Americas were both scientific and military adventures. They were scientific insofar as 'men of science' were aboard whose sole purpose it was to record information of interest to science. For instance the botanist Joseph Banks accompanied James Cook on his voyages of the pacific. They were also scientific insofar as their often explicit aim was to discover, observe and classify the unknown. Collected specimens of the previously unknown were then returned to Europe. Some were incorporated into museum collections, forming exhibits to inform and above all shock the public. The discovered Australian specimens included watercolours of strange antipodean plants, live specimens of fauna such as wombats (which became popular in French menageries), and even 'natives' such as Bennalong, a member of an aboriginal clan around Sydney who lived around what is now known as Bennalong point (where the Sydney Opera House now stands), who was returned to England for inspection.

Infamous expeditions to the interior of Australia such as Burke and Willis' were driven by the desire to discover this inland, chart it, and in some cases prove the theory correct of a fabled 'inland sea'. In *The Road to Botany Bay*, Paul Carter (1987) points out how it is that these expeditions, driven by western scientific curiosity bought about a particular construction of the Australian land. One of the first steps to the colonisation of the pacific was mapping it's land, peoples, and flora and fauna. Similarly the expeditions of explorers in the centre of the Australian continent were carefully aligned to attempts to colonise the land of aboriginal peoples. Indeed the theodolite provided to be one of the most vicious weapons of western colonialism. By understanding previous adventures in science that operated in a different technological complex in the service of different military objectives, it is possible to see that scientific endeavour has been linked to adventurism, the shock of the new, and military goals throughout its history. There is no radical fall from the grace of truth with techno-science. Rather, science has proved to be a worldly activity bound up in military adventurism and popular exhibition values. What Paul Virilio *doesn't* offers us is an investigation which contextualises techno-science in a broader history of science.[3] What he does offer us are some astute observations of the current technological apparatuses and their links to military and the media.

In order to briefly explore these links, I will focus on Virilio's analysis of the issue of globalisation. If we were to construct a historical narrative into which Virilio's suggestions around the issue of globalisation fit, it would be with colonial attempts to map the distant lands discussed above. Virilio argues that many of the theses advanced

3 There may be stylistic reasons for this. Virilio is quite clear that the 'shock of the new' characterises every aspect of our everyday lives. In the introduction to *Landscape of Events* Virilio (2000a) suggests that he is attempting to give an account of a situation of a kind of eternal *angelus novus* we experience everyday in this hypermodern world. His style of writing short, pithy pieces often focusing on specific moments with dates attached that may reflect his over-riding concern for understanding the characteristics of this hyper-modern or post-modern culture in its own terms.

in relation to globalisation are not correct – globalisation does not represent the termination of the historical dialectic in a state of global liberal capitalism (Fukuyama, 1992). Rather globalisation for Virilio is linked to the new forms of technology which appear in the military-industrial complex:

> To claim, as is now the case, that globalism illustrates the victory of free enterprise over totalitarian collectivism is to understand nothing of the current loss of time intervals, the endless feedback, the telescoping of industrial or post-industrial activity. (IB: 8)

For Virilio, globalisation involved the establishment of what Virilio calls a 'meta-geophysis' through continued 'tele-presence'. That is the geophysis of the world, and communities that are distributed and located in space come to be increasingly deterritorialised (to use Deleuze and Guattari's (1987) term), and then simultaneously reterritorialised in the global 'meta-geophysis'. Communities who once understood their culture, economic activities, society, politics and religion in terms of their immediate surrounds or perhaps nation state (geophysis) suddenly find that global patterns of culture, politics, and economic activities (the meta-geophysis) have more sway. To illustrate this thesis consider the process which occurs when an isolated valley in Papua New Guinea is 'discovered' by an anthropologist, its land surveyed by a geologists, and then mined by a multinational corporation all in the life-time of some members of the tribe. The economic activity in the village can no longer be understood exclusively in terms of the immediate valley and a few neighbouring tribes. Rather it must be considered in the context of a global market. If the price of the mineral being mined drops in London, then economic ruin for this village could follow. A second example of the deterritorialisation of our more immediate economic activities and the subsequent reterritorialisation of them in the 'meta geophysis' was seen during the 1997 Asian economic crisis. During this, nation states which we have previously understood as being more or less co-determinous of economies, attempted to buoy flagging currencies through buying. The repeated result was that the billions of dollars injected by national reserve banks simply disappeared with little or no change in currency rates. This seemed to indicate to many that nation states could no longer influence the economy. The geophysis of the nation state had been replaced by the meta geophysis of global economic markets.

On the deterritorialization of localised geo-physis into global 'meta-physis', Virilio is in agreement with many major accounts of globalisation (eg. Appadurai, 1996; Dicken, 1998; Burawoy *et al*., 2000; Harvey, 1989, 2000; Held, 1995; Held et al, 1999; Hardt and Negri, 2000). Where there is disagreement however is in the diagnosis of what drives this globalising process. Virilio argues it is digital technologies (which allow a quantum leap in speed) that are central in the construction of this global meta-physis through their ability to present and link in real time most spaces in the world:

> The coming of the 'live', of 'direct transmission', bought about by turning the limit-speed of waves to effects, transforms the old 'tele-vision' into a planetary grand-scaled optics. With CNN and its various offshoots, domestic television has given way to tele-surveillance. This sudden focusing – a security-orientated phenomena of the media monitoring of the life of nations – heralds the dawn of a particular form of day, which totally escapes the diurnal-nocturnal alternation that previously structured history. With this false day, produced by the illumination of telecommunications, an artificial sunrise, an emergency lighting system which ushers in a new

> time: world time, in which the simultaneity of actions should soon gain precedence over their successive character. (IB: 13)

An aspect that lies at the heart of this telecommunications system is a shift in our experience of time and space. Going further than Giddens' (1990) thesis that globalisation leads to time-space compression, Virilio suggests globalisation is a radical ripping away of time from its natural reference of the 'diurnal-nocturnal' alternation. This occurs first through illumination in cities (see also Virilio, 2000a, 'the big night'), and then through the creation of a globally present cyber-time. This cyber-time is far from an eccentric syndrome experienced by 'cyber-naughts' in selected countries who spend hours in Internet chat rooms. Rather it has profound implications for societies. Virilio talks about the "current general spread of tele-surveillance. A new vision of a world that is constantly 'tele-present' twenty-four hours a day, seven days a week, thanks to the artifice of this 'trans-horizon optics' which puts what was previously out of sight on display" (IB:13). It is this role of making the globe visual through networks of technology, and making this vision ever present which is at the heart of the global project. For Virilio this making ever present through a global tele-visual network includes advertising, news networks, satellite surveillance, global computer databases. Virilio points out that this tele-surveillance also extends to make observable the most intimate aspects of human life. Examples include an American woman who believes she is being assailed by ghosts and has installed web-cams in her home so internet users can warn her (IB: 58-68), the unborn foetus that is made visual through the sonography, and our DNA which is there for all to see thanks to genetic mapping technology. For Virilio this is all oriented around the creation of "a new global optic, capable of helping a panoptical vision to appear, a vision which is indispensable if the 'market of the visual' is to be established. The much vaunted globalization requires that we all observe each other and compare ourselves with one another on a continual basis" (IB: 61). This continual technological surveillance leads to what Gilles Deleuze (1992) called societies of control whereby mechanisms of control become present. This results in a situation where technologies of control become continual in lives of prisoners and employees alike:

> Have they not in France just authorized the use of electronic tagging devices on prisoners released on parole, transponders which enable them to be located at any point, thus avoiding further pressures on already overcrowed prisons? . . . And what are we to say of the enthusiasm of post-industrial companies for the cellphone which enables them to abolish the distinction between working hours and private life for their employees? Or the introduction in Britain not simply of 'part-time' but of 'zero-hour' contracts, accompanied by a mobile phone. When the company needs you, it calls and you come running. The reinvention of domestic servility ultimately on par with the electronic incarceration of offenders in the closed circuit of a police station. (IB: 67)

Virilio doesn't shy away from perusing the darker implications of this new technology and points out that a new military principal, associated with this society of control, also emerges:

> After the first bomb, the atom bomb, which was capable of using the energy of radioactivity to smash matter, the spectre of a second bomb is looming at the end of this millennium. This is the information bomb, capable of using interactivity of information to wreck the peace between nations. (IB: 63)

The result of these tele-visual technologies is a situation where citizens are constantly linked into an ever-present technological network, where all is rendered visible. The terrain in which the military operates has been fundamentally transformed. Borders are no longer the key point of war (they are only to be defended against so-called illegal immigrants). Rather there has been a fundamental re-ordering of global geopolitical space:

> Since the early 1990s, the pentagon has taken the view that *geo-strategy is turning the globe inside out like a glove*. For American military leaders, the global is the *interior* of a finite world whose finitude poses many logistical problems. And the local is the *exterior* , the periphery, if not indeed the 'outer suburbs' of the world. (IB:10)

The post-cold war geo-political space is one where there are no fissures in the global space, but a kind of global consensus, an order dominated by the global Empire (Hardt and Negri, 2000). Those outside of this global space or Empire are cast as rogue states. Military strategies then focus on policing the information network in order to ensure that 'information bombs' and 'visual crashes' such as the death of Princess Diana or the stock market crash are effectively managed. They also focus on ensuring the boundaries between the exterior and the local do not spill over into global spaces. This can be seen in cases such as the mobilisation of NATO forces in Kosovo for a so-called 'just war' (see Virilio, 2000b). The most recent and extreme example of this new military principal is the current 'war against terrorism' which has been declared by leaders of the global Empire (CNN, Bush, Blair etc). Many have argued that the problem is years of US foreign policy, aimed at ensuring localised issues (the Palestine conflict, particular regimes in some Middle Eastern countries, bombings of American consulates) do not spill over and affect the global space (oil production, international geo-political arrangements), have alienated particular groups to the point where they feel a need to engage in acts of war labelled as terrorism. The most obvious point in which the relatively localised issue of tension in the Middle East bustled to the dead centre of the global world order was with the September 11th attacks on the World Trade Centre. Using Virilio's framework, these hijacked aircrafts hurtling into the World Trade Centre towers should be considered as information bombs. These attacks were not attacks on apparatuses of war (tanks, airfields, soldiers), but on symbols of the new world order. The images of the planes careering into the twin towers exploded across the global information network "using interactivity of information to wreck the peace between nations" (IB: 63). For Virilio, technologies of tele-surveillance are deployed in the domestic sphere to watch over 'suspected terrorists' and 'threats to security'. These categories remain free-floating signifiers that may be applied to nearly any relatively organised group that challenges the Empire in any meaningful way. Technologies of tele-surveillance may then be deployed to watch over anyone from trade union groups, environmental activists, or any others deemed to be suspicious by the military-bureaucratic-corporate complex.

The work of Paul Virilio provides us with an initial bold step into the theorisation of techno-science, and its linkages with changing cultural, political, and military implications. The analytical framework places particular emphasis on the changing role of techno-science, and its darker implications for control and war. Virilio's style is brash, tending to over emphasise the historical fissures and apparent newness of the techno-science and shying away from the exploration of any particular site with the

careful depth and singularity required of empiricism. A writer who does examine similar themes, but with more care for historical continuities and empirical sites is Donna Haraway.

Of Mice and FeMale Men

Of the writers we have explored so far Donna Haraway provides the most detailed analysis of the vicissitudes and intertwining issues of current techno-science. Her work is contextualised strongly in the field of science studies, particularly with its extended attempts to examine and understand how technology and science is a process of active labour within a given economic and social context. Haraway extends approaches such as Bruno Latour's (1987) work on actor network theory, which points out how science is less a search for an eternal truth than an active bringing together of networks of human and non-human actors. It is often those with the most extensive and skilfully composed network who are able to compose their particular theories as truer than others. Haraway draws out the implications of an actor network theory model of knowledge for our conceptions of the subject. In *Simians, Cyborgs and Women* Haraway (1989) proposed her now celebrated cyborg thesis by asking where the boundaries of the subject are. Are they at the skin? If not, does the subject include the various technical apparatuses we attach to our bodies ranging from various prostheses to genetic technology to language? If so, how does this relate to the animals who we rely on testing these new technologies on? This series of questions leads Haraway to suggest that the network of technology in which we modern citizens conduct our life fundamentally re-orients the scientific assumption of an objective world which rational subjects investigate. For Haraway the theoretical apparatus of deconstruction is not required to dissolve the Cartesian subject at the centre of the scientific enterprise. Rather, the tightly interwoven network of technologies, humans, and animals that the scientific enterprise relies on put the human subject into doubt. Instead of talking about the human subject, Haraway proposes the concept of cyborg, a "cybernetic organism, a hybrid of machine and organism, a creature of social reality as well as fiction" (Haraway, 2000: 50). The cyborg therefore crosses boundaries between human, animal and technology due to the changing networks involved in technology:

> The implosion of the technical, organic, political, economic, oneiric, and textual that is evident in the material-semiotic practices and entities in late-twentieth century techno-science informs my practice of figuration. Cyborg figures-such as the end-of-the-millennium seed, chip, gene, data-base, bomb, foetus, race, brain, eco-system – are the offspring of implosions of subjects and objects and of the natural and artificial. (MW: 12)

It is with this conception of the cyborg that Haraway begins her investigation of techno-science in *Modest_Witness@Second_Millennium.FemaleMan©_Meets_ OncoMouse*™ (MW). She selects two particular cyborgs who guide us through our investigation of the complexities of contemporary technoscience. The first is FemaleMan, a kind of Herculine Barbin (1980) figure for the genetic era. Haraway borrows FemaleMan from the science fiction novel *The Female Man* by Joanne Russ. This cloned figure aims to represent a number of cyborgs – the issue of their genetic heritage and indeed own self being put under copy-write, and hence owned by a multinational corporation. In this

way the FemaleMan is a kind of hyper-alienated subject who prefigures current conflicts around techno-science corporations owning the genetic maps to populations of entire islands and tribes. The second cyborg introduced is OncoMouse. Like FemaleMan, OncoMouse is the product of genetic engineering. However unlike FemaleMan, OncoMouse is an already existing reality. OncoMouse was the first living entity to be put under copyright. It is a mouse with genes that are designed to automatically trigger the onset of breast cancer. This of course enables scientists engaged in developing treatments for breast cancer to do so more effectively and efficiently. OncoMouse is both the product of joint venturing between large corporations and universities, a piece of intellectual property as well as critical node in the techno-scientific network of human and non-human actors. For Haraway there is a degree of 'kinship' between OncoMouse (the present social reality of techno-science) and FemaleMan (a possible future for techno-science whose doubles consistently appear in science fiction). These lines of kinship include having spliced identities which are central to their everyday lives, being the products of writing technologies and hence being able to be put under copy-write, their 'queered' unstable identity being their everyday reality, both have 'gestated in the womb' of enlightenment and modernity, both are the product of trans-national scientific studies, and both are the facts of changing production of bodies (MW: 119-121).

The next aspect of Haraway's argument is to approach the 'modest witness' who observes and creates these cyborgs. Like the writers we have encountered earlier, Haraway draws direct lines between today's technologists and scientists and the Enlightenment. She does this by drawing on the story of Robert Boyle's experiments with oxygen recounted in Steven Shapin and Simon Schaffer's (1985) *Leviathan and the Air-Pump: Hobbes, Boyle, and the Experimental Life*. In this work they point out how Boyle's public demonstration of his particular theories which utilised a mechanical apparatus in order to portray theories as truth beyond human intervention. What Shapin and Schaffer point out is that the experiments took place in a particular public space (The Royal society) which excluded many (most notably women) and that the apparatus was powered by working men who were hidden under the stage. Boyle's experimental claims to Truth relied on the erasure of the entire actor network which these very experiments rely upon. This 'modesty' displayed by Boyle continues to colour the present day experimental ways of life, whereby the entire network of funding institutions, human actors such as laboratory technicians and research assistants, non human actors, and users of techno-science get erased. Instead of this approach, Haraway argues that scientific knowledge should accept a principal of 'strong objectivity' (Harding, 1986) whereby these broader networks that are so critical to the functioning of scientific networks are taken into account.

In order to begin to demonstrate what an analysis of the current situation where techno-science replaces the air-pump using the principal of 'strong objectivity' would look like, Haraway sketches out a context of 'the new world order' in which techno-science operates. The first important aspect is the role in which multinational corporations play in scientific investigation. The profits of many sectors of the economy rely on the continued development of 'bio-technology'. With OncoMouse, we have seen how life forms can become the next arena that is commodified by capital in the search to increase profit. The problems with this Haraway is quick to point out:

> The objections include increasing capital concentration and monopolization of the means of life, reproduction, and labour; appropriation of the commons of biological inheritance as the private preserve of corporations; the global deepening of inequality by region, nation, race, gender, and class; the erosion of indigenous peoples' self determination and sovereignty in regions designated as biodiverse while indigenous lands and bodies become the object of intense gene prospecting and propriety development; inadequately assessed and potentially dire environmental and health consequences; misplaced priorities for technoscientific investment funds; propagation of distorted and simplistic scientific explanations, such as genetic determinism; intensified cruelty to and domination over animals; depletion of biodiversity; and the undermining of established practices of human and non human life, culture and production without engaging those most effected in democratic decision making. (MW: 60-61)

Haraway also highlights the labour process involved within this network of capital and universities and other research institutions. Through the analysis of a series of adverts for biotechnology products, she points out how genes are actively worked upon by humans and how, like most labour processes, this may involve relations of exploitation. Like Virilio's analysis, she pushes her conclusions into investigating the realm of military technologies. Haraway suggests as there was a significant relationship between atomic technology and the military order associated with the cold war, so too there is a significant relationship between genetic technologies and the new world order. A clue to this linkage for Haraway is the redirection of the Los Alamos laboratory's focus from nuclear technology towards genetics and information technology. One is left to draw the conclusion that biological, information, and possibly genetic weapons may be the focus of future engagements.

In order to further develop this 'strong objectivity', Haraway turns from the economic and military frameworks towards the cultural framework that current techno-science rests upon. In order to sketch out the complex cultural framework in which techno-science operates she focuses on computer games like SimLife, where the player is able to genetically manipulate entire populations. She also points out the continuity of older Christian notions into writers like Richard Dawkins and post modern techno-science:

> Mere living flesh is derivative; the gene is the alpha and omega of the secular salvation drama of life itself. This is barely secular Christian Platonism. (MW: 133)

Indeed Haraway identifies a whole cultural apparatus around the creation of what she call 'gene fetishism' (see also Haraway, 2000: 89-95). Textbooks and pedagogical projects focusing on genetics play an important role. Finally she points out that Renaissance conceptions of mapping and visualisation also continue to underpin the mapping of the human gene. It is this broad knot of various practices she later compares with other historical practices around the issue of biology during the 20th century in a marathon tabulation of connections between things as apparently distant as museum exhibitions, evolutionary paradigms, the family, diseases of the blood, legal documents, instructions of how to act around aliens and popular images of apes (MW: 219-229).

Unlike Virilio, Haraway is careful to chart already existing alternatives to the dominant knot of techno-science. These 'sciences of liberation' she describes attempt to introduce a broader understanding of the networks of actors in which science operates, the political implications of these, and the ability to organise networks otherwise. One instance is the statistics of freedom project where statistical measures of public health are used as a lobbying tool to change the set up of the United States' highly

discriminatory health care system. A second instance is Nancy Scheper-Hughes' work focusing on public health in *favelas* in Brazil which points out the links between infant deaths, multinational corporate practice (the infamous Nestlé baby formula) and international agencies like the United Nations.

What Haraway offers the reader is both a widened understanding of technological and scientific practices away from simple *ratio* to include the whole knot of various economic, cultural, military and intellectual practices that are involved in apparently technical scientific producers of the day – such as the human genome project. She also offers the reader a sense of the broad framework in which the cyborgs such as OncoMouse are produced. What she finally offers is an awareness that these knots are actively reconstructed everyday, and that it is possible to re-craft them with greater liberatory potential.

Conclusion

In order to conclude this extended review of four works, let me return to a question posed in Heidegger's essay on technology – how can we craft a questioning of technology that frames it in terms of a broader *technē*? Adorno and Horkheimer do this by suggesting that modern technology (such as the culture industries) is a direct relative of enlightenment and particularly the adoption of *ratio* to be found in the Odyssey, and Juliette. Virilio does this through pointing out the intricate relations that exist between techno-science and the emergence of new geographies (globalisation), societies (societies of control), and military strategies (the information bomb). Finally, the work of Donna Haraway explores the complex knot of social, economic, cultural, military, and gendered practices that are involved in contemporary techno-science such as genetics. For each of these writers to ask the question of technology entails asking far more than technical questions.

As soon as the question of technology passes our lips it attaches itself to the points of good and evil. The works here enable a questioning of technology that moves beyond asserting technology is in and of itself good or bad. Each of these writers shows that ethico-political questions should not be targeted just at technology itself, but at the process of thought (enframing), histories of thought (enlightenment) that lie around it, and the military structures that are thoroughly knotted through technology. Indeed it is a mistake to consider a tool in isolation. Haraway has radicalised each of these claims by arguing technology is a complex knot of thought, histories, military uses, and many other strands as well. To ask ethico-political question about technology is to ask questions about each of these strands which are knotted together, and how they may be re-crafted.

Although the writers covered here allow our questioning of technology to be more complex, it is easy to read them as casting a moral judgement of kinds on technology and the knots which make it. Bitterness and lost hope is palpable as Heidegger looks at the dammed Rhine. The sad disgust of Adorno and Horkheimer as they watch the crowds flocking to the Los Angeles movie theatre flavours the prose of *Dialectic of*

Enlightenment. Paul Virilio is surely penning an analysis of Bush's package of legislation to 'counter terrorism'. While each of these writers remain relatively pessimistic Haraway takes on a somewhat more optimistic tone. Technology for her is something that may be re-crafted to deliver liberatory potential. What she fails to mention when talking about technologies of liberation is that these attempts at re-crafting techno-scientific networks through active intervention have changed little, with Nestlé continuing as one of the world largest food multinationals, and the American healthcare system continuing to be incredibly discriminatory.

Technology and modernity were supposed to move us beyond good and evil, giving us only the category of efficiency with which to pass judgement on the world. Religious ecstasies were supposed to be chastened by the cold icy night of reason. What we see in these four writers is a removal job that hasn't quite been completed. When we question technology, we can't help arranging the questioning in exactly the same way as good and evil. Ecstasy is still on offer in the icy night, evil technologies still fall from the sky, and good technologies grow from the grass roots up. So be warned, when the question of technology is asked the old anxieties of good and evil are not too far away. Perhaps questioning our tools tells us more about ourselves, our society and our desire for moral quandaries than even post-humanists like Haraway suspect.

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